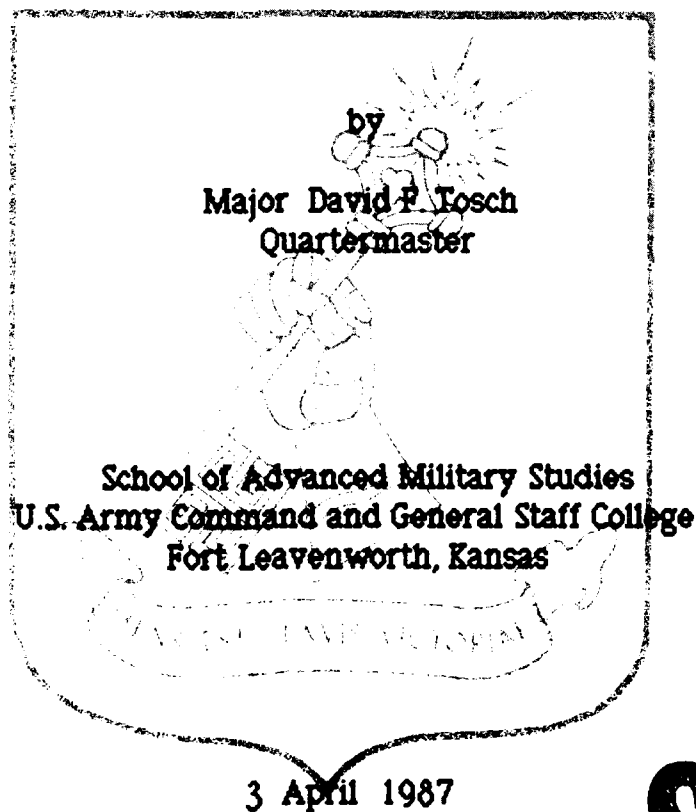


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German Operations in North Africa:
A Case Study of the Link Between Operational Design and Sustainment



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ABSTRACT

GERMAN OPERATIONS IN NORTH AFRICA: A CASE STUDY OF THE LINK BETWEEN OPERATIONAL DESIGN AND SUSTAINMENT, by Major David F. Tosch, USA, 40 pages.

This monograph analyzes the operational sustainment of Rommel's forces in North Africa. Rommel's operations are examined from his arrival in North Africa in February 1941 through his last offensive to destroy the British Eighth Army at El Alamein in August - September 1942. The purpose of the study is to examine the tension between operational planning and sustainment in remote areas. The North African case study provides a unique example of the relationship between operations and sustainment because Rommel achieved both operational success and suffered operational failure in an austere environment.

The paper serves as a vehicle that facilitates an improved understanding of how operations must be synchronized through effective operational and sustainment planning. After conducting an analysis of Rommel's major operations the operational sustainment options available to Rommel are examined. Then the paper speculates on how Rommel might have improved the linkage between operational planning and sustainment. Based upon this analysis, the implications of logistics for operational planning is addressed.

The study concludes that when operations are not sequenced in accordance with sustainment capabilities a campaign is in jeopardy. The results Rommel achieved can be linked directly to his sustainment capability.

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SECTION I: INTRODUCTION

One of the most significant challenges facing U.S. Army operational planners is preparing for major operations and campaigns in undeveloped theaters of operation. This is due largely to the lack of readily accessible supplies and local resources in an austere environment. Everything an army consumes must be transported to such a theater and then distributed. It is critical to the success of operations in such a theater that logistical needs are thoroughly planned for and supplies are provided when called for by the plan or required by the force.

The purpose of this paper is to examine the tension between operational planning and sustainment in remote areas. Although adequate sustainment in and of itself may not win a campaign, history is replete with examples in which ineffective sustainment has lost a major operation or campaign. It is imperative that operational plans and logistical arrangements be synchronized--particularly in an austere environment. Otherwise a commander may reach or exceed his culminating point without realizing his predicament. A better understanding of this relationship between operational planning and sustainment will allow commanders and their planners to conduct more synchronized operations.

Before discussing operational sustainment an adequate definition must be provided so that it can be distinguished from tactical sustainment.

"Operational sustainment comprises those logistical and support activities required to sustain campaigns and major operations within a theater of operations."¹ The operational or theater of operations sustaining base links

strategic support with Combat Service Support (CSS) units organic to tactical forces. By contrast, "tactical sustainment includes all the CSS activities necessary to support battles and engagements and the tactical activities which precede and follow them."² In short, operational sustainment is concerned with providing the resources required to conduct major operations and campaigns. Tactical sustainment is designed to meet immediate support requirements. Operational sustainment capability, therefore, determines the bounds within which operations can succeed--if it does not provide a solid foundation the outcome of the operation is placed in jeopardy. Throughout the remainder of this paper the term sustainment will refer only to operational sustainment.

Alexander the Great was extremely successful in sustaining his Macedonian Army in an austere environment characterized by limited agriculture.³ Because Alexander's army was designed for speed and mobility it possessed fewer pack animals than other contemporary armies. As a result of the limited transport capability, his army could not remain self-sufficient for long distances when separated from navigable rivers or seaports. He found unique solutions to solve the provisioning problem for each area he encountered. Alexander's superior abilities in gathering intelligence and his thorough planning permitted him to overcome the obstacles that thwarted other armies. For example, he would obtain intelligence concerning the routes, climate, and resources of the country and then operate with a small, light force while the main army remained behind at a base--well supplied. Alternatively, he would divide the army into smaller units so that their diminished requirements could be provisioned more easily during their advance through the country-side. It is entirely possible that "Alexander better understood the capabilities and limitations

of his logistic system than perhaps any other commander, before or since."⁴ The level of synchronization Alexander achieved between operations and sustainment should be the same sought today--little has changed in its significance. On the other hand, warfare and armies have changed extensively since the days of Alexander. Planning has become much more complex because of added variables with which one must contend. Commanders also must grasp the capabilities and limitations of more sophisticated logistics means.

In order to uncover the linkage between operational planning and sustainment in an austere theater, German operations conducted in the World War II North African theater will be examined. The North African case study provides a unique example of the relationship between operations and sustainment because Erwin Rommel both achieved operational success and suffered operational failure in this remote area.

The enormity of the task facing Rommel was compounded by the characteristics of the theater of operations. Because it was a secondary theater Rommel was often unable to get the priority for resources he desired. The lines of communication (LOCs) were interdicted continuously by the enemy because German forces seldom possessed air superiority within the theater of operations. The ports of debarkation in North Africa were constrained in both number and capacity, a constraint which was further compounded by the lack of air superiority. Useful railroads were unavailable to Rommel and only one good hard surface road existed--along the coastline. Lastly, because Rommel was dependent upon motor transport to sustain his force, he required large numbers of cargo vehicles which were also in short supply. However, even after considering these constraints,

Rommel achieved tremendous tactical successes. It was at the operational level that Rommel encountered serious shortcomings.

This paper about Rommel's campaign in North Africa provides a vehicle that will contribute to an improved understanding of the tension between operational design and sustainment. The results Rommel achieved can, in large part, be linked to his sustainment capability. This paper will conduct an analysis of Rommel's major operations between early 1941 and the fall of 1942 in order to determine how he integrated sustainment capability into his conduct of and planning for operations in North Africa. Next, the operational sustainment options available to Rommel will be analyzed. Then the paper will speculate about how Rommel might have improved the linkage between operational planning and sustainment. Finally, based upon this analysis, the implications of logistics for operational planning will be addressed.

SECTION II: ANALYSIS OF ROMMEL'S MAJOR OPERATIONS

In preparation for operations in North Africa Rommel undertook several key initiatives to smooth the transition of his force onto the continent. First, knowing that the British advance against crumbling Italian resistance had to be slowed, he ordered that the port of Benghazi be interdicted by the German Air Force. He also recognized that once the British realized they would be opposed with a defense in the vicinity of Sirte they would be forced to observe an operational pause to bring up supplies over their extended LOCs.⁵ This would gain time for him to strengthen his forces and

aid him in withstanding further enemy attacks. He was acutely aware of the importance of sustainment in the theater he was about to enter.

Because the Italians were forced to retire from Cyrenaica, the Axis' were constrained to the use of one harbor--Tripoli--which was classified easily as the largest Libyan port.⁶ Realizing the importance of establishing an adequate defense, Rommel challenged his logistics staff to displace immediately the German units arriving at Tripoli. They were to be moved forward to Sirte--over 300 miles to the east. Rommel's Quartermaster (Major Otto) readily recognized one hurdle that would persist throughout the campaign in North Africa.⁷ This was a severe shortage of ground transportation assets. As there was no railway running eastward from Tripoli the Afrika Korps had to operate at a distance from its base half again as large as that normally considered the limit for the sustainment of a force by surface transportation.⁸ In this instance it was overcome by moving supplies along the coastline with small ships from Tripoli to Buerat and Ras el Ali, partially easing the burden on motorized transportation means.⁹

Initially Rommel was well supplied due to his relatively short LOCs but they rapidly lengthened to 400 miles, within a month, up to El Agheila. Consequently, the British felt he was in a precarious position which would allow them time to prepare for an Axis advance. They felt that their defensive positions, west of El Aghella, were almost beyond their support capabilities which stretched 300 miles from Tobruk. In contrast, Rommel considered his positions at El Aghella well within his sustainment capabilities.¹⁰ The British estimated that it would take Rommel at least 30 days to move the necessary supplies forward in order to sustain a drive eastward. At this early stage of operations in North Africa the British clearly underestimated Rommel's capabilities. Time for the moment, appeared to

be on the British side; however imaginative, aggressive or daring the enemy commander might be, he could not ignore the iron laws of logistics. But Wavell did not yet know Rommel.¹¹

Even at this early stage of operations in North Africa one factor that would have a later impact stands out. There was continual bickering between the administrative staff who were primarily interested in clearing the port at Tripoli and the staff of the German 5th Light Division who, just recently arrived, were concerned with building up stocks in the forward area. Rommel refused to devote attention to resolving these administrative matters. This is the first indication that Rommel appeared not to concern himself with logistics questions while always expecting his staff to have supplies available where and when they were required.¹² Because the Italian *Commando Supremo* was responsible for getting supplies to North Africa and discharged at the ports, Rommel was to later suffer the consequences for not concerning himself with sustainment matters in the planning stage.

ROMMEL'S FIRST OFFENSIVE

By the middle of March Rommel realized that the British were not contemplating offensive operations because they were in a weakened state which he felt he could exploit. When he traveled to Berlin to make a case for undertaking an offensive earlier than planned he was told to remain cautious because of constraints in transportation and supply. Nevertheless, in late March Rommel authorized a raid on El Agheila which possessed a much needed water supply. Rommel believed that the British were momentarily weak, a vulnerability which had to be exploited in order to gain

the initiative. However, he could expect no reinforcements until the end of May when the 15th Panzer Division was to arrive. At that time he was to attack Agedabia and perhaps Benghazi. Rommel felt strongly that he could not limit his efforts to Agedabia and Benghazi. Instead he felt he would have to occupy the whole of Cyrenaica because the Benghazi area could not be held by itself. However, the addition of the 15th Panzer Division would double the German motor-transport requirement to 6,000 tons per day--proportionally ten times as much as the forces preparing for operations in Russia.¹³ Compounding his sustainment problem was the fact that coastal shipping could not alleviate the transportation shortfall. Finally, Tripoli's port capacity was exceeded by these new requirements.¹⁴ Again, there is little evidence Rommel concerned himself with how his operations in North Africa would be sustained. Although he was aware of his logistic shortfalls, what he saw as a unique opportunity to gain the initiative was an overriding factor in his decision to press eastward.

The last day of March Rommel began an operation against Mersa el Brega. In part he justified this action because it provided access to improved water supplies and a good jump-off point for the May attack.¹⁵ After meeting light initial resistance Rommel realized that the British forces were retreating--an opportunity he could not resist. Despite his instructions to wait until late May before attacking Agedabia he pressed into, through, and 12 miles east of Agedabia by the end of the first day. Indications are that Rommel had kept a close eye on the speed and efficiency with which his panzers and vehicles had been refueled and restocked. This aided in the quick advance.¹⁶ When it became apparent that the British intended to withdraw without decisive action Rommel decided it was an opportune time to take Cyrenaica with one bold stroke. However, this effort did not progress

without difficulty. At the end of the first day the 5th Light Division predicted that it would need four days to replenish its fuel supplies. Rommel intervened in the matter directing that the division unload every available vehicle, return to the resupply point at Arco dei Fileni, obtain enough supplies for an advance through Cyrenaica, and return within 24 hours.¹⁷

Rommel was soon confronted by the Italian Commander-in-Chief, General Gariboldi, who was upset that Rommel disregarded orders from Rome. Gariboldi also reminded Rommel that the supply situation was at best tenuous. Rommel persisted in his view that he could not allow an excellent opportunity slip by. "I had made up my mind to stand out from the start for the greatest possible measure of operational and tactical freedom and, what is more, had no intention of allowing good opportunities to slip by unused."¹⁸ Sustainment realities began to impact, however, for several lead elements were stranded for want of supplies and units were strung out 20-30 miles. For instance, on 7 April Rommel wanted to attack Mechili but could not mass enough combat power due to the scattered units and lack of fuel.¹⁹ Rommel stated that the experience he gained during his advance through Cyrenaica would form the basis for planning his later operations. He felt that the standards he had set, as in any precedent setting operation, were based on something less than average performance and should not be submitted to.²⁰ If his subordinates thought they had to meet unrealistic demands up to this point they must have thought Rommel ruthless with his later demands--particularly his logisticians.

Although Rommel achieved a great tactical success with his pursuit across Cyrenaica, a large portion of the British forces successfully withdrew to Tobruk, a fortress which was to cause Rommel much grief for the remainder

of 1941. By the 8th of April Rommel's forward elements reached Derna while many of his columns were stranded around Tengeder without fuel or water. On the 9th of April Rommel was preoccupied with logistics arrangements and bringing up more troops.²¹ Nevertheless, as early as 10 April Rommel announced his intention of attacking the enemy forces in Tobruk.²² However, by the middle of April Rommel's first attempt to seize Tobruk was unsuccessful. At this point the Italian *Commando Supremo* urged the German OKW to call a halt before Rommel advanced into Egypt as they were concerned that he would bypass Tobruk and continue the advance. A pause would allow the Afrika Korps to recover its strength through resupply and reorganization. Although Rommel felt that the capture of Tobruk was essential, because it sat astride his lines of communication (LOCs), he also felt it could not be achieved until more German combat units were available--how these additional forces would be sustained was not his concern.²³

General Halder, Chief of the General Staff, OKH was aware of Rommel's request for additional forces and quickly became concerned that they could not be provided without shifting resources from other critical commitments. Furthermore, he and others became concerned with Rommel's tactical operating style which took him away from overseeing the proper administration of the Afrika Korps. General Halder designated General Paulus to go to Africa, assess the situation, and re-emphasize to Rommel that OKH had only limited resources with which to support him. Upon his arrival in North Africa Paulus discovered another attack on Tobruk was being planned for 30 April but he refused to approve it until he investigated further. Although he quickly gave his approval, once Tobruk was taken, no further advance was to be made and Cyrenaica would be retained by holding

the line Siwa-Sollum. After this second major attack on Tobruk a stalemate still existed with German forces surrounding the city in depth. Paulus instructed Rommel to pause, reorganize his force, and establish a secure base of supply because his force was too exhausted to continue further operations.²⁴ On 12 May General Paulus prepared a report on the situation in North Africa. He noted that the logistics posture, including shortages of fuel, ammunition, rations and motorized transport was critical.²⁵ He was emphatic on the point that no further forces be sent to the theater until enough supply stocks were accumulated. General Halder estimated that Axis forces required 50,000 tons of supplies a month. Indications were that 30,000 tons were for current maintenance of the force and the remainder for the build up of supplies required before a further advance could be undertaken.²⁶ Furthermore, there was to be no advance beyond Sollum without OKH permission until the 15th Panzer Division arrived.²⁷

In early May Rommel finally realized that his force was not strong enough to mount a successful attack against Tobruk.²⁸ Although one of Rommel's chief reasons for capturing Tobruk was to improve his sustainment capability he may have been mistaken for several reasons. First, the port was thought to be capable of handling 1,500 tons per day but could hardly reach 600. Second, the German navy was concerned about using it for off-loading large ships and felt that the ports at Tripoli and Benghazi offered better capabilities (some of this can possibly be attributed to the navy's concern about enemy air). Lastly, there was not even enough coastal shipping capability fully to employ the port of Benghazi let alone Tobruk.²⁹

The port of Benghazi was underutilized for several reasons besides the shortage of coastal shipping vessels. First, because of a lack of air defense at Benghazi the port suffered heavy damage. As a result, the only means of

getting supplies into the port and discharged was with the use of small coastal vessels. Because coastal shipping capacity was estimated at only about 29,000 tons per month, a large amount of supplies would still have to be moved forward by motorized transport from Tripoli.³⁰ Additionally, because Benghazi was continually interdicted, coastal shipping only managed to transport 15,000 tons per month and supplies began to stack up at Tripoli.³¹ Rommel felt that much more could have been accomplished had the Italians made more of an effort in improving and expanding Benghazi port capacity.³² Furthermore, there was no suitable logistics headquarters to control the flow of supplies forward. This factor combined with the severe shortage in motorized transport resulted in a clearly insufficient sustainment capability--especially for a situation characterized by long LOCs. Afterward, Rommel admitted that he had not spent enough time to train his forces and make preparations for the advance through Cyrenaica. He attributed the lack of success and resulting stalemate at Tobruk largely to not having an opportunity to make proper preparations.³³

Once the Afrika Korps assumed a defensive position east of Tobruk during late May, the main supply route was cut by the British fortress. As a result, it took an entire day for a resupply column to drive around Tobruk. Although Rommel recognized the need for an improved by-pass road the Italians were unable to complete the project and Rommel did not have the necessary construction assets available. Rommel also realized the extent of the sustainment problem in moving supplies by motorized transport over 1,000 miles. Rommel felt that the solution to reduce the extraordinarily long ground LOC was to have the Italians ship more supplies to Benghazi.³⁴ He also stated that it was impossible for him to do anything about it as it was an Italian responsibility to get him the supplies he needed. In the meantime

Rommel had to prepare for the British counter-offensive, *Operation Battleaxe*, which would be a significant operational success on his part. This analysis will now move to the next major period of the war--the winter of 1941-42 and *Operation Crusader*.

OPERATION CRUSADER

In late November 1941 Rommel was making preparations for another assault on Tobruk when the British suddenly attacked to relieve Tobruk. Rommel's logistical staff felt that insufficient fuel and ammunition stocks had been collected with which to sustain another attack. This was because during September and October port installations at Tripoli and Benghazi had been under constant attack and supply convoys across the Mediterranean were interdicted heavily. When the British launched *Operation Crusader* on 18 November the Afrika Korps and its logisticians were preoccupied with the capture of Tobruk harbor. However, the attack forced Rommel suddenly to turn his attention in the other direction before attacking Tobruk.

After reorienting his forces and conducting several successful battles, Rommel had the British Crusader forces split into fragments and scattered over the desert. Rommel figured that by cutting the British LOCs with a rapid and violent maneuver he could increase their disarray and block British withdrawal routes to Egypt. He also informed his Quartermaster that he wanted to capture British supply dumps along the way. Essentially Rommel had taken command of the Afrika Korps at this point because General Cruewell was absent. When Cruewell reappeared he suggested that time should be spent on reorganizing the Afrika Korps, clearing up the litter of the enemy units, and salvaging vast stocks of captured and abandoned

materiel before it could be reclaimed by the enemy. Rommel summarized the situation as follows: "The greater part of the (enemy) force aimed at Tobruk has been destroyed; now we will turn east and go for the New Zealanders and Indians before they have been able to join up with the remains of their main force for a combined attack on Tobruk. At the same time we will take Habata and Maddalena and cut off their supplies. Speed is vital; we must make the most of the shock effect of the enemy's defeat and push forward immediately and as fast as we can with our entire force to Sidi Omar."³⁵ However, both the 15th and 21st Panzer Divisions were short of ammunition and fuel due to the heavy action over the preceding days and were not prepared.

As Rommel pushed forward in his southeasterly drive to the frontier he bypassed two large British supply depots which remained undiscovered by the Axis forces. If Rommel had been a bit more conservative and mopped up enemy forces as he progressed he most likely would have found the enemy supply dumps.³⁶ This would have hindered the British advance and sustained Rommel's forces much longer. However, Rommel's impulsiveness dictated speed over a methodical advance and he suffered the consequences.

Rommel, accompanying the advance elements of 21st Panzer reached the "wire" (border between Egypt and Lybia) at 1600 directing all efforts once again without the presence the General Cruewell, the Afrika Korps Commander. Traveling at least an hour behind Rommel, Cruewell witnessed enemy formations pushed aside by the spearhead, reorganizing themselves and causing casualties in the trailing elements of his forces. The speed at the head of the column was causing growing attenuation of the body. By the time Cruewell reached the "wire" at Gasr el Abid he found his corps spread

from south of Halfaya Pass back in a 50-mile hook to Gabr Saleh with an awesome vehicle casualty rate.

Offerstleutnant Westphal, who in Rommel's absence was the *de facto* commander of Panzergruppe Afrika, was attempting to support his commander, now 70 miles away. Without being aware of the dire circumstances his force was in, Rommel was issuing his orders for the following day, the 25th of November, in which he intended to destroy the remnants of the enemy army. Once again he brushed aside Cruewell's concerns over exhaustion and lack of sustainment capability. Rommel then continued to drive eastward far beyond his advance headquarters in the general direction of Habata in search of British supply dumps he had promised his Quartermaster.³⁷ He was unsuccessful and when returning had his famous incident in attempting to breach the "wire" with his Mammoth command vehicle.³⁸

With Rommel and the Afrika Korps scattered about the frontier an attempt was made by the British to link up with the Tobruk garrison. Westphal was watching these developments but was unable to communicate with Rommel or Cruewell. During November 25-26 he tried to contact them and finally contacted General von Ravenstein late on the 26th suggesting that the 21st Panzer Division move towards Tobruk to assure that the front there did not collapse. Although Rommel at first took great exception to Westphal's action, after he examined the situation it was clear he had a threat endangering Tobruk to his rear. The "Dash to the Wire" had reduced the 21st Panzer Division to less than one-half its authorized strength in men and less than one-third in equipment. Nevertheless, Rommel ordered them to attack the New Zealanders and complete the annihilation of the remaining Tobruk forces. On 1 December the Tobruk corridor had been cut and the

port was under seige again. Once the New Zealanders were defeated but before Tobruk was secured Rommel desired to conduct a second "Dash to the Wire".

On 4 December Rommel was apprised of the condition of his forces. Although his transport position was eased with the capture of vast numbers of British trucks the advantage was offset by dwindling fuel supplies. Also losses in terms of personnel and equipment were immense. Of the 250 Panzers with which the Crusader battles started, fewer than 40 remained and existing stocks of ammunition were insufficient to fight any battle of consequence. Rommel would be fortunate to acquire enough fuel to retreat, let alone advance any further from his bases.³⁹ At this point Rommel realized that the main effort should remain south of Tobruk. This was because his formations were too dispersed and were being continually harassed, the cumulative effects of which were beginning to take a toll. As a result, in early December Rommel decided to abandon the Tobruk front and go back to the defensive positions south of Gazala--the same defensive position chosen in May 1941 after the Axis attacks on Tobruk failed.

By late December *Operation Crusader* was over and Rommel was undoubtedly discouraged. "His army had been defeated, and he knew it, not by superior military conception, training, or even prowess-but by logistic inadequacy on the part of his own government and their allies."⁴⁰ Rommel felt that after defeating the New Zealanders, on the outskirts of Tobruk, he was robbed of victory by the shortcomings in his sustainment capability. It should be pointed out however that he did not mass his forces in attempting to defeat the Tobruk garrison--his forces were still scattered when he besieged Tobruk the second time. "He would pay more attention himself to

that side of affairs in the future, for it was obviously courting disaster to leave such matters in other hands than his own."⁴¹

ROMMEL'S SECOND OFFENSIVE AND THE BATTLE OF GAZALA.

In January 1942 Rommel, by then back at his old start point, was able to launch a counter-offensive to the east from El Aghella. Once again he did not bother to inform his high command nor his allies of his intentions and proceeded in his pursuit of victory. Several factors allowed Rommel to regain the initiative. After conducting an orderly withdrawal to El Aghella, Rommel's army still possessed excellent morale and retained its high efficiency. Second, the Axis supply lines were shortened considerably. This eased significantly the logistical burden. Third, Axis convoys to North Africa were getting through in larger numbers due to more efficient air cover provided by the German Air Force. Finally, Rommel had evidence that the British forces were again in disarray.

British authorities also remained confident because Rommel had incurred heavy losses during *Operation Crusader*, suffered from a lack of reinforcement, and encountered supply difficulties. The significant increase in supply convoys across the Mediterranean had been discounted. During November the percentage of German cargo that failed to get across the Mediterranean rose to 62% and the amount reaching North Africa was halved from the month before. The British success forced the Axis powers to increase their efforts to protect the supply convoys and during late 1941 the Royal Navy lost significant numbers of capital ships. The bulk of the British fleet in the Mediterranean was no longer present and Malta was heavily bombed by the German Air Force which operated from airfields in the bulge

of Cyrenaica. When the British were suddenly deprived of the ability to cut off supplies and reinforcements to Rommel, the arrival of Axis supply ships at Benghazi and Tripoli transformed the tactical situation in North Africa and enabled Rommel to resume offensive operations with reorganized forces.

Once again, Rommel had great initial success when he found he had taken the enemy's forward units by surprise. During the first three days of the advance the Axis forces scattered the British forces, inflicted sizeable losses and suffered few themselves. However, the Afrika Korps was unable to stay in close contact with the retreating British forces. This was due to a lack of fuel and the need to pause and acquire enormous quantities of bulk supplies captured in Benghazi. By 2 February Rommel's force was only 35 miles from Tobruk and although triumphant it was exhausted. Rommel was considering another attack because the British forces were extremely weak. However, he decided he did not have enough fuel.⁴² General Bastico, the Commander in Chief of Axis forces, reminded Rommel that his mission was to defend Tripolitania and that adequate supplies could not be provided for a further advance. Rommel was satisfied that his position at Gazala would provide a good jumping-off place for future operations.

Although this second offensive had many parallels with the offensive conducted during the previous April it had several key differences. First, there was a sound plan which had been worked out in detail by Rommel's staff. Also, the supply system was better organized--especially for fuel. Finally, with the knowledge that British LOCs were overextended and that large quantities of British supplies, with the exception of fuel, were positioned well forward on the ground, the temptation for Rommel was too great to pass up.⁴³ Once these supplies were captured a British offensive

would be impossible for several months and Rommel could strengthen his own forces.

After a lull of three months, during which Rommel increased his supply stockpiles, he attacked the British positions at Gazala on 26 May 1942 beginning the Battle of Gazala. The British, as Rommel was well aware, were steadily gaining strength faster than the Axis forces. The British 8th Army could be reinforced more rapidly than Axis forces because the British government was providing all the materiel it could acquire to its forces in North Africa. Large British convoys continued to arrive relatively unimpeded by traveling around the Cape. Furthermore, the British could meet all their fuel needs from refineries located within the theater.⁴⁴ Rommel felt that the British would attack as soon as they felt strong enough, "Our southern flank lay wide open and they had a large choice of possible operations to choose from. A constant threat would hang over our supply lines. Retreat, if we were forced into it by the danger of being outflanked, would be fraught with tremendous difficulties, due to the fact that most of my Italian divisions were non-motorized. But the British were not to have the chance of exploiting their opportunities, for I had decided to strike first."⁴⁵

In less than a day many of the supply dumps of the British XXX Corps at El Adem fell to the 90th Light Division. However, by late afternoon of the second day the 90th Division was separated from the Afrika Korps and the British launched a counterattack. "British motorised groups were streaming through the open gap and hunting down the transport columns which had lost touch with the main body. And on these columns the life of my army depended."⁴⁶ Also, British fighters and fighter-bombers had focused their attention on Axis motor transport columns.⁴⁷ By the 28th Rommel had

reason to be concerned, the Afrika Korps was scattered over a large area, he had already lost 200 tanks, and the 15th Panzer Division was out of fuel and ammunition because it also had become separated from its supply columns.⁴⁸ On the morning of the 29th Rommel led supply columns up to the main body of the Afrika Korps which had taken up defensive positions. Rommel realized that it was too risky to continue the attack before a secure supply route was opened and so directed the efforts of his forces toward sealing off the British in the east and opening a wide gap in the minefields to the west. Rommel noticed that the British were not quick to attack his defensive positions so launched another attack on 31 May.

Within two weeks Rommel had won the Battle of Gazala and the British forces were retreating to the Egyptian frontier where a defensive line could be re-established. There would be sufficient time to do so because Tobruk, the key to British sustainment in Cyrenaica, was in Rommel's path. Evidence of the British defeat was present in the form of undamaged motor transport columns left on the roads with abundant supplies. It was less than a week later, on the 21st of June, that Rommel drove into Tobruk. With it came practically everything Rommel's forces needed logistically except water. This included over 2,000 tons of fuel, large quantities of British and German ammunition, 2,000 serviceable vehicles and approximately 5,000 tons of provisions.⁴⁹ Characteristically, Rommel decided that it was better to take advantage of the British disorganization subsequent to their defeat at Gazala than to spend time making elaborate plans to besiege Tobruk--he was right! Tobruk fell easily and his bold triumph led directly to his promotion to Field-Marshal and in Rommel's mind would lead to a quick conquest of Egypt--certainly the high point during his time in North Africa.

Rommel was aware that his forces were worn down, but because he had captured vast quantities of supplies he believed a further offensive possible. Furthermore, Rommel had been promised by *Commando Supremo* that, considering his present location, adequate supplies could only be provided if Tobruk were in his possession. This led him to the idea of exploiting British weakness and precluding their efforts to bring fresh forces westward from Egypt. Rommel realized that his sustainment system would be faced with serious problems once he advanced into Egypt. However, he felt that the supply staffs in Rome were capable of shipping sufficient supplies to ports available in the forward area of operations. The top Italian authorities could have done this at any time. When I gave orders for the advance into Egypt, I was assuming that the fact of final victory in Egypt being now within reach would spur even the Italian *Commando Supremo* into some sort of effort."⁵⁰ Rommel's forces began moving eastward on 22 June.

On 29 June the last fortress port in the western Egyptian desert, Mersa Matruh, was in Rommel's possession and the British had again suffered heavy lossess. As soon as the fortress had fallen Rommel resumed his eastward movement. There had been a general understanding within the Panzerarmee that after the capture of Tobruk there would be a pause of at least one month. However, when this did not occur the logistics system was not prepared to support a further advance. Captured supplies and materiel certainly played a key role in sustaining the push forward. For example, by this time 85% of the Axis motorized transport consisted of captured enemy vehicles.⁵¹ However, it took time to gather and integrate these assets within the force once they were captured. Also, ammunition was running short as supplies were not arriving in sufficient quantities when needed. Rommel could visualize his approaching culminating point, "When it is remembered

that in modern warfare supplies decide the battle, it is easy to see how the clouds of disaster were gathering for my army."⁵² Because Rommel saw the British forces gaining strength with improved equipment and increased shipments of supplies with significantly shortened LOCs he felt it imperative to crush the British forces immediately.

On 1 July the Afrika Korps began its attack on the El Alamein line. After three days of attempting to crack the British defense Rommel decided to call off the attack because of his critical supply condition, his severely attrited units, and the strengthened enemy forces. He realized that he had to give his forces a few days' rest and reorganization. His attempts to replenish his supplies were complicated by the extremely long surface LOCs. The ports of Tobruk and Mersa Matruh were still not in use and supplies were being transported from Benghazi and Tripoli 750 and 1,400 miles away.⁵³ From this point on Rommel could achieve only limited tactical offensive success and the front became static.

Rommel focused all his efforts on preparing for another offensive. It was important that this be done quickly as large quantities of supplies were being shipped from Britain and America and would be arriving in ever increasing numbers by mid-September. Rommel and his staff estimated that by the end of August the British would have 70 infantry battalions, 900 tanks and armoured vehicles, 550 light and heavy guns and 850 anti-tank guns available for action.⁵⁴ They also realized that a superhuman effort would be necessary to sustain Axis forces if they were to be capable of challenging the British build-up. The hurdles in accomplishing this were many.

Beginning the end of July, the Royal Air Force (R.A.F.) had placed priority on interdiction of Axis LOCs from the ports to the front, both the main supply

route along the coast and coastal shipping. Ships attempting to disembark in the forward ports at Tobruk, Bardia and Mersa Matruh were constantly harassed. During August Tobruk, which had become the main Axis port, became the primary target for British air efforts. The German Air Force was over-stretched as only limited assets were available to patrol the coastal road and waters and British air-power grew steadily in strength. As a result, the supplies received in August hardly met the daily requirements of a static combat environment and a build-up of stocks was impossible. Furthermore, the condition of the motor transport fleet was of particular concern. At any one time 35% of the fleet was deadlined and since most of the vehicles were captured, parts could only be obtained through cannibalization.

Finally, Rommel felt that the most significant shortcoming with regard to the sustainment of his force was the weakness of the logistics organization supporting him. He felt that because the Italian's were mismanaging the sea LOCs and the Germans could exert little influence over the system, sustainment would remain a restraint. Rommel had no influence over the shipping lists, the ports of arrival nor the proportion of German to Italian cargo shipped. Apparently there were enough men, vehicles, and supplies in Italy to meet Axis requirements--the problem was how to get them to the front and to the right forces.⁵⁵ Rommel summarized his feelings in the following manner, "It is always a bad thing when political matters are allowed to affect supply or the planning of operations. Where these two questions are concerned, any ill-feelings deriving from other fields must be swept ruthlessly aside and all efforts must be concentrated, regardless of all other considerations, to the one purpose of military victory."⁵⁶

THE BATTLE OF ALAM EL HALFA

Rommel estimated that he had to attack by the end of September even though he understood his predicament in that he was consuming far more than he was receiving. The operation would be the first phase of a major attempt to enter Egypt and capture the Suez. On 22 August Rommel identified his logistical needs for the operation. He mandated that 6,000 tons of fuel and 2,500 tons of ammunition reach him by the end of August. Although the Italians promised to do everything possible and sent 10,000 tons of fuel, including 5,000 tons of aviation fuel, four of the seven ships sent were sunk. By the end of August only 1,500 tons arrived at Tobruk but Rommel decided he could wait no longer for the reasons already identified.⁵⁷ Even if sufficient fuel reached the port it had to be transported to the front. El Alamein is 350 miles by road from Tobruk and it took several days to negotiate the poor coastal road and enemy air attacks. Knowing that the fuel and ammunition shortages would restrict his operation to the vicinity of El Alamein he decided to take the risk of gaining a quick victory at Alam el Halfa.

Once again within a matter of a few hours the attack met stiff resistance, the combat forces encountered fuel shortages and by noon on 1 September Rommel decided to revert to defensive positions because there was no hope of getting sufficient fuel forward. Although fuel was available in the trains element the roads through the minefields were clogged and supply vehicles were unable to get through to the combat forces. During the morning of 2 September Rommel ordered a deliberate withdrawal to remove his forces from the British minefields. His reasons were a shortage of fuel, a slow tactical start attributed to the effective minefields, and the continual British

air attacks. He had also just been informed that it would not be until 7 September before sufficient fuel supplies could possibly arrive at the port.⁵⁸ Rommel's defeat at Alam el Halfa was essentially the beginning of the end for the Axis forces. All the operational sustainment shortcomings Rommel had to overcome at this point were just too much.

Rommel's alternative after taking Tobruk in stride was to pause just east of Tobruk instead of attempting to pursue on to the Suez. By halting east of Tobruk the German Air Force could have been used to support an operation that had already been planned against Malta. The final result was that Malta began to play an ever increasingly important role in interdicting the Axis sea LOCs. By the fall of 1942 the British forces on Malta had regained their strength and succeeded in almost bringing Axis shipping to a standstill. In addition, after pursuing eastward Rommel's forces were even further extended beyond the ports making resupply increasingly difficult.

Rommel was now at the end of a long and frequently interrupted LOC, whereas the British were in directly in front of their well supplied and secured main theater supply base. The flow of supplies to the Germans had almost been shut off while the British received an increasinly steady flow. The Battle of Alam Halfa was the last major Axis offensive operation in Libya and Egypt and was the precursor to the decisive Battle of El Alamein. From this point on Rommel's forces steadily weakened while the British forces grew stronger.

SECTION III: ANALYSIS OF THE OPERATIONAL SUSTAINMENT OPTIONS AVAILABLE TO ROMMEL

Although Rommel coped with a severely constrained sustainment system by continually improvising to meet his needs, the system could have been further strengthened in a variety of ways. Repeatedly Rommel pointed toward the Italian *Commando Supremo* as the party responsible for his meager materiel resources but certainly other factors contributed to his operational sustainment shortages. As a result, Rommel had several options available to him to improve the sustainment of his force during the course of operations in North Africa and some were carried out with effective results.

On several occasions Rommel was acutely aware of the presence of British supply storage areas and eased his own sustainment shortfall by capturing and putting them to use. The possibility of capturing enemy supplies certainly affected the conduct of operations in order to shore up his austere logistics posture. Because Rommel's tactics were inherently designed to get into the enemy rear and cut his LOCs there was always a strong possibility Rommel would gain a windfall in the form of enemy supplies. Axis forces, particularly in the later stages, lived off of British rations, wore British clothing and used British vehicles and fuel. Although captured supplies were always put to good use and were necessary to maintain the initiative at several critical junctures none of Rommel's offensive operations were initiated solely to gain enemy resources.

When the British railroad was captured at Tobruk Rommel had great hopes of using it to get supplies up to El Alamein.⁵⁹ This would have aided substantially his sustainment capability especially if the port at Tobruk were employed simultaneously. Because locomotives were not available in theater

nor available for shipment from Italy the railway sat idle. By the fall of 1942 the spoils of British supplies and equipment became a burden. With the front now static British fuel stocks were hard to come by and there were no supplies to keep the captured British equipment operational. For example, because 85% of Rommel's motorized transport was of British and American manufacture, as well as much of his artillery, there were no more British parts and ammunition with which to support them.⁶⁰ Reliance on enemy supplies and equipment assisted greatly in getting Axis forces well into Egypt but began to restrain Rommel before he could progress any further.

It is clear Rommel improvised to a great extent particularly with regard to the use of enemy supplies and materiel. However, because he relied on the Italian *Commando Supremo* to keep the sea LOC open and transport sufficient supplies to North Africa, improvisation with regard to operational logistics matters was an area Rommel largely disregarded. There were several instances, however, where the Italians improvised in sustaining the Axis forces. In early 1941 Italian submarines were used to transport fuel to the advance elements of the Afrika Korps.⁶¹ Both the Italians and Germans employed limited coastal shipping in the early stages. Later in 1941 when British interdiction of the shipping lanes became effective air transport was employed for emergency resupply. However, because the Germans had no experience in reinforcing the sand surfaces on the coast and in the desert for landings by amphibious craft and aircraft they relied on the Italians to take care of the matter. Improvisation can be an excellent means of sustaining a force particularly when unforeseen emergencies arise. However, on several occasions Rommel became dependent upon captured enemy supplies, a circumstance which does not bode well for operational planning. When

Rommel had to rely upon improvisation to sustain his operations he found himself at a great disadvantage--especially so when considering that his opponent had little need to improvise logistically.

On several occasions Rommel conducted effective withdrawals. On each occasion he was able to strengthen his force by shortening his ground LOC. However, at no time did Rommel use a withdrawal just to shorten his LOC. During his most dramatic withdrawal, in December 1941, Rommel reduced his LOC by more than 400 miles when he positioned his force at El Aghella. Although he was able to strengthen his force because his ground LOC was reduced by 50%, the primary reason he fell back to El Aghella was because it provided a strong defensive position and was an excellent start point for his next offensive.⁶² During the same period of time the sea LOC were open and supplies poured into the ports which assisted greatly in reorganizing and sustaining Rommel's forces. All these factors allowed Rommel to rebuild his units and sustain his second major offensive in early 1942 but this was not his primary purpose for conducting the withdrawal.

SECTION IV: SPECULATION ON AN IMPROVED LINKAGE BETWEEN OPERATIONAL PLANNING AND SUSTAINMENT CAPABILITY

It is clear in the preceding analysis that Rommel did not pay great attention to sustainment matters while openly admitting that logistics was not his concern. When, during the course of operations, Rommel's forces were slowed because of supply shortages he became personally involved in finding solutions in order to regain the initiative. But this was logistics at the tactical level and reactive in nature. When Rommel addressed operational sustainment shortcomings he normally accused the Italian *Commando*

Supremo of incompetence as they continually fell short of meeting his requirements. However, if a campaign is to be successful, sustainment planning must be an integral component of operational planning and this seems to have been a key deficiency in Rommel's conduct of operations in North Africa.

Rommel's operational planning prior to and upon his arrival in North Africa was negligible. Rommel's perspective on the conduct of operations far exceeded the expectations of the Italian authorities to whom he was supposed to report and from whom he obtained support. There is no evidence that Rommel attempted to build up supplies and organize a sustainment system that would allow him to conduct operations across North Africa. For this he relied totally on the efforts of the Italians who attempted to restrain him as they seemed to understand the capabilities and limitations of their sustainment system. The British, on the other hand, had a well planned and organized sustainment system. Seldom did British units run out of fuel and ammunition. Although this could be attributed to the slower tempo of their operations, it was more because of the methodical manner in which their planning and organizing was accomplished. The British employed a forward depot system that provided a base and supply network that eventually covered the entire desert. Although this system was susceptible to enemy raids, because the depots were not mobile, the British forces were well supplied considering the desert environment. Furthermore, the British had access to a prosperous Egyptian base of operations, almost a miniature war economy, that remained well secured and supplied throughout operations in North Africa. The British seemed to understand Clausewitz's dictum that the, "army and base must be conceived as a single whole."⁶³

Rommel was forced to deal with significant resource shortfalls as he was conducting operations in a secondary theater and was not receiving priority of support from Germany. This along with the burden of having to rely on Italian support placed significant constraints on the number of alternatives Rommel had in conducting his operations. His predicament seemed to drive him in a quest for a decisive battle so that he could finish the war in short order. However, two critical aspects were overlooked in planning his conduct of operations eastward. First, in order to keep his lengthy ground LOC secure, more emphasis could have been placed on securing bases and ports along the coastline as operations progressed. If enough effort had been devoted to protecting the ports with air defense assets and expanding port capacity, surface LOCs certainly would not have been as extended or as vulnerable. Although the necessary resources may have been hard to come by, there is no evidence that any major effort was put into this.

The other factor that should have been confronted was Malta and the British interdiction of the sea LOC. Rommel apparently felt this problem was beyond the scope of his responsibility, but he had to concern himself with the matter if he wanted to conduct major operations. Because he had no operational sustainment system or materiel stockpiles of any significance within North Africa, his operations were dependent upon an easily interdicted sea LOC leading back to Italy. When Rommel influenced the decision to divert air support from an operation that had been planned to neutralize Malta and instead used it in support of his own ground operations he put his entire operational sustainment system at risk. Once his sea LOC was interdicted there were never sufficient resources on the continent to sustain operations for any length of time. Essentially, Rommel's theater

support base rested in Italy which had to be regarded as part of his theater of operations.

Having analyzed both Rommel's operational success and failure there seems to be a common thread that runs throughout. When the sea LOC was open Rommel's forces were well sustained and capable of conducting major operations. When the sea LOC was heavily interdicted Rommel reached his culminating point within a period of several weeks. Although this is an over simplification the sea LOC did have a profound impact on Rommel's capability to conduct operations. Because Rommel was forced to rely on one line of support the British were able to focus their interdiction efforts with tremendous results. Crete was employed as an intermediate supply base but this did not happen until late 1942. If employed earlier it could have served as an alternate line of support that was closer to Benghazi and Tobruk. Without alternate lines of support there was no redundancy in the sustainment system so that the interdiction of the single sea LOC had the potential to achieve decisive results.

Another commander who conducted operations in a secondary theater characterized by a undeveloped theater of operations, was extremely successful. Field Marshall The Viscount Slim was methodical in his planning of operations in Burma. He devoted much of his attention in planning operations to the sustainment of his forces. He also took great risks with his sustainment system which was barely sufficient to meet his needs. For example, he introduced an additional division into the theater without an augmentation of sustainment assets at a critical point late in the war.⁶⁴ However, when he did so he had a firm grasp of what his sustainment capabilities were and how far they could be stretched.⁶⁵

Several of his operations were designed specifically to strengthen his sustainment system. For example, the capture of Myingyan was designed to gain a river port in order to use the Chindwin River for transporting supplies and to gain a key road to Meiktila. In order to use the rivers as a means of transporting supplies Slim directed that a shipbuilding yard be constructed at Kalewa on the Chindwin River. This was accomplished with few outside resources, a classic example of improvisation.⁶⁶ Another mode of transportation, employed extensively due to the restricted terrain, was air transport. An entire network of air resupply bases was constructed. This was extremely effective because the British continually maintained air superiority over the theater. Finally, the British were able to get the Alon-Ava and Myingyan-Meiktila railways operating after several bridges were replaced, engines were repaired, and jeeps converted for rail use. Thus another vital mode of transportation was available.

Slim, like Rommel, had to face severe resource constraints and had to face the facts of coalition warfare in dealing with allies and his sister services and meeting their demands. During the An operations the only method to resupply the force was by air because of the dense jungle. However, the R.A.F. decided the aircraft to support the operation had to be diverted and the operation had to be abandoned. On another occasion Chiang Kai-shek suddenly demanded the immediate return of all U.S. and Chinese forces under Slim's control. This diverted several U.S. air transport squadrons. In order to overcome resource shortfalls Slim unhesitatingly shifted priorities of support to his forces. This was accomplished by accepting risk in the assignment of missions thereby assuring that his forces with key roles were not overextended logistically.

Slim's greatest challenge in sustainment came during preparations for crossing the Irrawaddy River. The ground LOC extended over 500 miles from the railhead to the river. There were only five months in which to make the roads and bridges negotiable but it was carried out smoothly. Roads, rivers, rail and air were all used effectively to overcome an extremely long LOC. Slim clearly had a firm grasp of what it would take to sustain a campaign in Burma. The reason he achieved such great success was because his sustainment and operational planning were synchronized.

SECTION V: IMPLICATIONS

The purpose of this monograph was to examine the tension that exists between operational planning and sustainment. From the preceding analysis of Rommel's operations in North Africa one should conclude that there is a distinct relationship. Commanders cannot permit the shackles of logistics to dictate operational plans. Instead, they must be intertwined if success is to be achieved, particularly in an undeveloped theater of operations. Rommel's experience in North Africa is an excellent example of what can happen if operational design and sustainment are not synchronized.

One key factor that Rommel did not have in his favor was time. Rommel felt that if he were to win in North Africa he would have to do it quickly with a decisive battle. By emphasizing early offensive operations Rommel consciously decided not to devote his efforts and attention on building a logistics infrastructure on the African continent. Immediately upon his arrival he took the initiative, thus there was no opportunity to stockpile supplies or organize an effective sustainment system. He instead relied on the Italians to look after his sustainment. Slim, by contrast, used time to his

advantage and methodically organized an infrastructure that eventually paid enormous dividends. Rommel apparently felt that the sustainment system could be stressed and still support his forces and, although he came close to making it work, it always fell short when he most needed it--largely because it was so thinly resourced to begin with.

Secure LOCs are a necessity in order to sustain operations. As pointed out earlier Clausewitz emphasized the importance of insuring that the army and its base of operations are recognized as a "single whole". Because Rommel was dependent upon one tenuous LOC that stretched from Italy, across the Mediterranean, into North Africa, and across the desert there was no alternate means with which to move supplies in large quantities. Emergency resupply by air is not sufficient for large mechanized forces, particularly when the enemy has air superiority. The one suitable road in North Africa for motorized transport ran along the Mediterranean coastline and there were no other adequate roads and no rail lines to employ. Moreover, the Italians were unable to build additional roads and railways or improve what was already available. As a result, there was little redundancy in LOC capability so that the British were able to concentrate their efforts in interdicting an invariable line of support.

Even before his arrival in North Africa Rommel was informed that extensive operations could not be adequately supported and that his mission was to assist the Italians in holding Lybia. There was absolutely no assurance that sufficient quantities of supplies could be provided to Rommel at any time by the Italians. Even after Rommel understood that he was operating in a secondary theater and could not command the resources he needed from Germany he refused to relent in his efforts to get to Cairo.

Once again as so often seen in other campaigns air superiority was a decisive factor. Although air support did not influence Rommel's tactical success it was critical to his operational capability. The British use of air strikes against Mediterranean shipping lanes and the ports of debarkation proved decisive. British possession of Malta aided greatly in the Mediterranean effort while forward airfields in Egypt were well within striking distance of Tobruk and the other forward ports. Air resupply was employed, but it was limited and should only be considered as tactical sustainment even though it can have operational significance as Slim proved.

When operations are not sequenced in accordance with sustainment capabilities the campaign is in jeopardy as was highlighted by Rommel's experience in North Africa. Possibly he was doomed from the start based upon his dependence on the Italians and the fact that he could not depend upon his own country to provide the requisite resources. It is obvious that there were differences across the board in the way the Italians and Germans did things militarily. But the key difference from which Rommel may have suffered the most was that the Italian economy was not on a war time footing. Much more could have been done if the Italian national and military strategies even closely resembled those of its ally. There are serious overtones here for coalition warfare, a subject which is beyond the scope of this paper but vitally important to what occurred in North Africa. Moreover, allies may be the primary means of sustaining operations in undeveloped theaters of operation, the ramifications of which may offer the most important implication of all.

ENDNOTES

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